

crawford.callie@gmail.com

PROFESSIONAL APPOINTMENTS

University of Louisiana at Lafayette

- **Postdoctoral Researcher** in the Kane Lab (August 2021- Present)

EDUCATION

New Jersey Institute of Technology

- **PhD.** in Biology- Ecology and Evolution, May 2021 (4.00 GPA)
- Dissertation: These Fish Were Made For Walking: Morphology And Walking Kinematics In Balitorid Loaches

College of Charleston

- **M.Sc.** in Marine Biology, December 2014 (4.00 GPA)
- Thesis: Skeletal Anatomy in the Chondrichthyan Tree of Life

University of Rhode Island

- **B.S.** in Marine Biology, May 2010
- Minors: Leadership Studies and Wildlife & Conservation Biology
- *Summa cum laude*, University and Departmental Honors (3.92 GPA)

RESEARCH EXPERIENCE

Dissertation Research (2016-present)

- Dissertation research under NSF Understanding the Rules of Life grant #1839915
- Documenting specialized morphology in balitorid loaches, freshwater fishes of south and southeast Asia
- Using μ CT to compare morphological differences related to terrestrial walking in fishes and tetrapods
- Determining the biomechanics of terrestrial walking in balitorid loaches:
 - Collecting and analyzing Kinematics, Electromyography, and force transmission data
- Spring 2020 fieldwork in Thailand to collect and film fish for kinematics

Associate in Research in the Boyer Lab, Duke University (2015)

- Temporary position helping with completion of a grant on primate dental topography and morphology
- Completing MicroCT scans and segmentations of casts of extinct and extant primate teeth
- Completing MicroCT and medical CT scans of fossil primates for current research in the Boyer Lab

Research Assistant in the Naylor Lab, College of Charleston (2015)

- Segmenting CT scans of sharks, rays, and skates
- Scanning chondrichthyan specimens at the Medical University of South Carolina (MUSC)
- Mentoring undergraduate and graduate students

Master's Thesis Research (2011-2014)

- Surveyed skeletal variation among Chondrichthyan fishes, creating a comparative anatomical atlas
- Created over 100 3-Dimensional digital segmentations from CT scans
- Noted patterns of chondrification and identified areas for future study

Visiting Graduate Student, the American Museum of Natural History (November 2013)

- Completed a portion of my thesis research under the mentorship of Dr. John Maisey

Functional Morphology and Ecology of Marine Fishes, Friday Harbor Marine Laboratory (Summer 2012)

- Studied material properties of hagfish and gunnel skin

Undergraduate Research with Dr. Cheryl Wilga, University of Rhode Island (2009-2010)

- Assisted graduate students with thesis and dissertation research in elasmobranch functional morphology
- Observed feeding behavior of newborn spiny dog fish pups

Laboratory Technician, Rutgers University Marine Field Station (*Summer 2009*)

- Assisted faculty and graduate students with summer research projects with emphasis on summer flounder bycatch mortality studies

NSF REU Participant, Rutgers University Marine Field Station (*Summer 2009*)

- Implemented a summer flounder research project with guidance from advisor
- Studied movement of tagged summer flounder carcasses as part of a larger discard mortality study

Undergraduate Research with Dr. Evan Preisser, University of Rhode Island (*2008-2010*)

- Aided graduate students in Hemlock Woolly Adelgid and Hemlock Scale research
- Identified arachnid species for species richness studies

TEACHING EXPERIENCE

Teaching Assistant, NJIT (*2016-2018*)

- Planned, prepared, and graded laboratory lectures, quizzes, and practical examinations
 - Comparative Vertebrate Anatomy (*Fall 2016, Fall 2017, Fall 2018*)
 - Foundations in Ecology and Evolution (*Spring 2017*)
 - Ecological Field Methods- Honors (*Summer 2017 and 2018*)
 - Mammalian Physiology (*Spring 2018*)
 - Evolution of Animal Behavior-Honors (*Summer 2018*)

Teaching Assistant, College of Charleston Department of Biology (*2011-2012*)

- Planned and presented lectures and administered quizzes and practical examinations
 - Concepts and Application in Biology (*Fall 2011*)
 - Evolution, Form, and Function of Organisms (*Spring 2012*)

Supplemental Instruction Leader, University of Rhode Island (*2010*)

- Conducted twice-weekly tutoring, study skills, and review sessions for students in an introductory biology course with a high fail rate

WORK EXPERIENCE

R&D Engineer II in the Shared Materials Instrumentation Facility (SMIF), Duke University (*2015*)

- Assisted in the operation and maintenance of the MicroCT scanner
- Trained users on the use of the MicroCT Facility
- Performed MicroCT scans and reconstructions for internal and external users

Administrative Assistant, Riverlands Marine Surveyors, Louisville, KY (*Spring 2011*)

- Processed barge draft surveys, time sheets, and invoices
- Finalized survey reports and Maintained database records.

Animal Rehabilitation Intern, Mote Marine Laboratory (*2010-2011*)

- Assisted with rehabilitation of sea turtles and cetaceans through basic husbandry and animal care
- Maintained water quality and habitats and assisted with veterinary procedures

Marine Naturalist Intern, Port Townsend Marine Science Center (*2010*)

- Led hands-on education programs in marine science, natural history, and conservation
- Maintained tanks on a cold-water flow-through system and cared for animals in exhibits
- Worked with the volunteer docent team to interpret exhibits for the public
- Assisted with the marine mammal stranding network.

PUBLICATIONS

- Crawford C.H.**, Z.S. Randall, P.B. Hart, L.M. Page, P. Chakrabarty, A. Suvarnaraksha, B.E. Flammang. (2020). Skeletal and muscular pelvic morphology of Hillstream Loaches (Cypriniformes: Balitoridae). *Journal of Morphology*, 281(10). jmor.21247.

- Cohen, K.E., **C.H. Crawford**, L.P. Hernandez, M. Beckert, J.H. Nadler, B.E. Flammang. (2020). Sucker with a fat lip: the soft tissues underlying the viscoelastic grip of remora adhesion. *Journal of Anatomy*, 237(4), joa.13227.
- Cohen, K.E., B.E. Flammang, **C.H. Crawford**, L.P. Hernandez, (2020). Knowing when to stick: touch receptors found in the remora adhesive disc. *Royal Society Open Science* 7.
- Cohen, K.E., L.P. Hernandez, **C. H. Crawford**, and B.E. Flammang. (2018). Channeling vorticity: Modeling the filter-feeding mechanism in silver carp using μ CT and 3D PIV. *Journal of Experimental Biology*, 221(19), jeb183350.
- McQuiston, A.D., **C. Crawford**, U.J. Schoepf, A. Varga-Szemes, C. Canstein, M. Renker, C.N. De Cecco, S. Baumann, and G. J.P. Naylor, (2017). Segmentations of the cartilaginous skeletons of chondrichthyan fishes by the use of state-of-the-art computed tomography. *World Journal of Radiology* 9, no. 4: 191.
- Clark, A. J., **C. H. Crawford**, B. D. King, A. M. Demas, & T. A. Uyeno, (2016). Material Properties of Hagfish Skin, with Insights into Knotting Behaviors. *The Biological Bulletin*, 230(3), 243-256.
- Crawford, Callie.**, Jenny M. Kemper, and Gavin JP Naylor. (2016). Complete mitochondrial genome of the winghead shark, *Eusphyra blochii* (Elasmobranchii: Sphyrnidae). *Mitochondrial DNA*.
- Yergey, M., T. Grothues, K. Able, **C. Crawford**, and K. DeCristofer. (2012). Evaluating discard mortality of summer flounder (*Paralichthys dentatus*) in the commercial trawl fishery: Developing acoustic telemetry techniques. *Fisheries Research*. 115-116: 72-81.

INVITED SEMINARS/LECTURES

- These Fish Were Made for Walking: Morphology and Walking Kinematics in Balitorid Loaches*, Integrated Biology Seminar Series, University of Akron, Integrated Biosciences Department, Akron, OH (2021)
- CT Scanning: A Modern Approach for Morphological Studies*, Evolution and Diversity of Fishes, University of Rhode Island, Biology Department, Kingston, RI (2021)
- The Walking Cavefish*, Ichthyology, Humboldt State University, Biology Department, Arcata, CA (2020)
- Walking Fish- They Like to Move it, But How?* Biological Principles, College of the Holy Cross, Biology Department, Worcester, MA (2020)
- The Waterfall Climbing Cavefish*, Into the Darkness: Research and Conservation of Cave Organisms Across the Globe Outreach Event by the Metropolitan Society of Natural Historians at the American Museum of Natural History, New York, NY (2019)
- Chondrichthyan Diversity*, Vertebrate Evolution, Rutgers University-Newark, Federated Biology Department, Newark, NJ (2019)

ORAL PRESENTATIONS

(* DENOTES PRESENTING AUTHOR)

- Crawford, C.H.**, C.L. Cerrato-Morales, Z. S. Randall, P. B. Hart, A. Webber-Schultz, L. M. Page, P. Chakrabarty, A. Suvarnaksha, and B. E. Flammang. “Comparative Kinematics of Terrestrial Walking in Balitorid Loaches of Thailand,” Oral Presentation- *Society for Integrative and Comparative Biology*, Virtual Conference, January 2021.
- Crawford***, **C.H** and B.E. Flammang. (2020) Rutgers- Newark and NJIT Biology Colloquium Series, Newark, NJ- “Little Fishy Steps to a PhD”
- Crawford***, **C.H.**, C.L. Cerrato-Morales, and B.E. Flammang. (2020) *Society for Integrative and Comparative Biology*, Austin, TX- “Comparative Kinematics of Terrestrial Walking in Two Balitorid Loaches”
- Biondi, A.A., H.E. Amplo, **C.H. Crawford***, K.E. Bemis, and B.E. Flammang. (2020) *Society for Integrative and Comparative Biology*, Austin, TX- “Adventures in scaling and remodeled morphology: the case of the Ocean Sunfish”
- Page*, L., Z. Randall, P. Chakrabarty, P. Hart, **C. Crawford**, and B. Flammang. (2019) *Joint Meeting of Ichthyologists and Herpetologists*, Snowbird, Utah- “Evolution of Walking in Balitorid Loaches as a Model for Vertebrate Invasion of Land”

- Flammang*, B.E., **C.H. Crawford**, D. Soares, A. Suvarnaraksha, P. Chakrabarty, P. Hart, L. Page, L and Z. Randall. (2019) *International Congress of Vertebrate Morphology*, Prague, Czech Republic- "Terrestrial Walking in Fishes with Tetrapod-like Skeletons"
- Biondi*, A.A., K.E. Bemis, **C.H. Crawford**, and B.E. Flammang. (2019) *International Congress of Vertebrate Morphology* Prague, Czech Republic- "Adventures in Scaling and Remodeled Morphology: The Case of the Ocean Sunfish"
- Crawford***, **C.H.**, and B.E. Flammang. (2019) *Evolution*, Providence, RI- "Walking Fishes and the Evolution of the Tetrapod Pelvic Girdle"
- Crawford***, **C.H.**, and B.E. Flammang. (2019) *NJIT-Rutgers University, Newark Graduate Student Research Day*, Newark, NJ- "Pelvic Morphology in the Balitorid Loaches"
- Crawford***, **C.H.**, Z.S. Randall, P.B. Hart, L.M. Page, P. Chakrabarty, and B.E. Flammang. (2019) *Society for Integrative and Comparative Biology*, Tampa, FL- "The Muscles That Move The Fishes That Walk"
- Bernstein*, J.M., **C.H. Crawford**, D.K. Wainwright, S. Ruane, and B.E. Flammang. (2019) *Society of Integrative and Comparative Biology*, Tampa, FL- "Snake Scale Keels: A Three-dimensional Investigation of Function"
- Cohen*, K.E., L.P. Hernandez, **C.H.Crawford**, and B.E. Flammang. (2018) *Society of Integrative and Comparative Biology*, San Francisco, CA- "Secrets in master filtering: Using mu CT and 3D PIV to model Silver carp filter feeding"
- Crawford***, **C.H.**, and B.E.Flammang, (2017) *Society for Integrative and Comparative Biology*, New Orleans, LA. "Skeletal Morphology of a Walking Cave Fish"
- Crawford***, **C.H.**, (2016) *Mid-Atlantic Regional SICB DVM/DCB Meeting*, Newark, NJ. "These fish were made for walking"
- Clark*, A.J., **C.H. Crawford**, B.D. King, A.M. Demas, and Uyeno, TA. (2015) *Society of Integrative and Comparative Biology*, West Palm Beach, FL- "Material properties of hagfish skin with insights into knotting behaviors"
- Crawford***, **C.**, and G. Naylor. (2014) *Joint Meeting of Ichthyologists and Herpetologists*, Chattanooga, TN- "Anatomical Characters as Informative Ornaments on the Chondrichthyan Tree of Life"
- Crawford***, **C.**, and G.J.P. Naylor. (2014) *Society for Integrative and Comparative Biology*, Austin, TX- "Evolution of the Skeleton in Chondrichthyan Fishes"
- Crawford***, **C.**, and G.J.P. Naylor. (2013) *Joint Meeting of Ichthyologists and Herpetologists*, Albuquerque, NM- "Exploring Chondrichthyan Anatomy through Computed Tomography"

POSTER PRESENTATIONS

(* DENOTES PRESENTING AUTHOR)

- Crawford***, **C.H.**, P.B. Hart, Z.S. Randall, P. Chakrabarty, L.M. Page, and B.E. Flammang. (2019) *International Congress of Vertebrate Morphology*, Prague, Czech Republic- "The Road to a Phylogenomically-Based Bioinspired Robotic Model Approach to Address the Evolution of Terrestrial Locomotion"
- Biondi*, A.A., K.E. Bemis, **C.H. Crawford**, and B.E. Flammang. (2019) *Society of Integrative and Comparative Biology*, Tampa, FL- "Mola mola Mismatched Muscle Mechanics"
- Amplo*, H.E., **C.H. Crawford**, B.E. Flammang. (2019) *Society of Integrative and Comparative Biology*, Tampa, FL- "Head, Shoulders, Elbows, Fins: Frogfish Fin Morphology"
- Crawford***, **C.H.**, Z.S. Randall, and B.E. Flammang. (2018) *Joint Meeting of Ichthyologists and Herpetologists*, Rochester, NY- "These Fins Were Made for Walking: Tetrapodal Morphology of Balitorid Fishes"
- Crawford***, **C.H.**, Z.S. Randall, and B.E. Flammang. (2018) *Society for Integrative and Comparative Biology*, San Francisco, CA- "Variation in Pelvic Morphology of Balitorid Fishes"
- Crofts*, S.B., **C. Crawford**, M. Bonnan, and B. Flammang. (2018) *Society of Integrative and Comparative Biology*, San Francisco, CA- "Skeletal morphology of swimming lizard tails"

- Gonzales*, L.A., **C.H. Crawford**, J.T. Gladman, J.P. Alexander, J.I. Bloch, G.F. Gunnell, and D.M. Boyer. (2017) *American Association of Physical Anthropologists*, New Orleans, LA- "Documenting Skeletal Anatomy of Early Adapiforms"
- Crawford***, C., J. Denton, J. Maisey, and G. Naylor. (2015) *Interdisciplinary Approaches in Fish Skeletal Biology*, Tavira, Portugal- "Skeletal Anatomy in the Chondrichthyan Tree of Life"
- Crawford***, C., and G.J.P. Naylor. (2015) *Society for Integrative and Comparative Biology*, West Palm Beach, FL- "Skeletal Anatomy in the Chondrichthyan Tree of Life"
- Crawford***, C., C. Canstein, and G.J.P. Naylor. (2014) *Joint Meeting of Ichthyologists and Herpetologists*, Chattanooga, TN- "CT Scanning Chondrichthyans: No Bones About It"
- Crawford***, C., B. King, and A. Clark. (2013) *Society for Integrative and Comparative Biology*, San Francisco, CA- "Material Properties of Taut and Slack Skins in Elongate Fishes"
- Crawford***, C., T. Grothues and K. Able. (2009) Rutgers REU Presentation, New Brunswick, NJ- "Exploring Summer Flounder, *Paralichthys dentatus*, Carcass Behavior in Preparation for Discard Mortality Studies"

AWARDS, HONORS, AND GRANTS

RESEARCH FUNDING

- Friday Harbor Laboratories, Stephen and Ruth Wainwright Graduate Research Award, \$600 (2020, unable to use due to covid)
- Sigma Xi, Grants-in-Aid of Research, \$993 (2018)
- American Museum of Natural History, Lerner Gray Memorial Fund, \$2,000 (2017)
- American Society of Ichthyologists and Herpetologists, Edward C. Raney Fund Award, \$1,000 (2017)
- Research Triangle Nanotechnology Network (RTNN), Free-Use Fund Award, \$1,000 (2016)

AWARDS

- Executive Women of New Jersey, Graduate Award, \$5,000 (2020)
- New Jersey Institute of Technology, Excellence in Instruction Award, \$1,500 (2019)
- Carl Gans Collections and Charitable Fund, Conference Grant for JMIH, \$500 (2018)
- American Elasmobranch Society, Jeffrey & Carol Carrier Student Poster Award, \$300 (2014)
- College of Charleston, Outstanding Graduate Scholar in Marine Biology (2014)
- Society for Integrative and Comparative Biology, Charlotte Mangum Student Support Award (3x, 2013-2015)
- College of Charleston, Student Research Colloquium Second Place Poster (2012)
- National Science Foundation, Honorable Mention, Graduate Research Fellowship Program (2011)
- University of Rhode Island, Alpha Award for achievement in research (2010)
- University of Rhode Island, Dean's List (2006-2010)

TRAVEL GRANTS

- New Jersey Institute of Technology, Graduate Student Association Travel Award, \$3,600 (5x, 2017-2020)
- American Elasmobranch Society, Student Travel Award, \$625 (2014)
- College of Charleston, Graduate Program in Marine Biology Travel Award, \$750 (2x, 2013-2014)
- American Society of Ichthyologists and Herpetologists, Student Travel Award, \$300 (2013)
- College of Charleston, Office of Graduate Studies Research and Travel Grant, \$750 (3x, 2012-2014)
- College of Charleston, Marine Biology Graduate Student Association Travel Award, \$300 (3x, 2012-2014)
- College of Charleston, Graduate Student Association Research Presentation Grant, \$500 (2x, 2012-2013)

SCHOLARSHIPS

- New Jersey Institute of Technology, Class of '58 Scholarship, \$4,030 (2017)
- New Jersey Institute of Technology, Provost Doctoral Assistantship Award, \$25,000/year (2016-2018)
- Mote Marine Laboratory, Mote Marine Laboratory College Intern Scholarship, \$1,500 (2010)
- University of Rhode Island, Elmer A. Palmatier Award, \$250 (2009)
- University of Rhode Island, Mary Matzinger Merit Scholarship, \$1,000 (2009)
- University of Rhode Island, Henry Davis Merit Scholarship, \$1,462 (2007-2009)
- University of Rhode Island, Centennial Scholar, \$28,000 (2006-2010)
- Foundation for Asia Pacific Education, Scholarship for Overseas Education, \$2,500 (2008)

MENTORSHIP AND LEADERSHIP ROLES

Colloquium Committee, Biology Student Leadership, Federated Department of Biology (2019-2020)

- Work with other committee members to facilitate organization of weekly Biology seminars and end of the year research day highlighting student research

Honors Thesis Mentor, New Jersey Institute of Technology (2017-2018)

- Mentored an undergraduate student completing her Honors Thesis

High School Mentor, New Jersey Institute of Technology (2017)

- Mentored two high school interns as part of the NJIT Provost High School Summer Research Interns

President, United Council of Academics at NJIT (UCAN), Graduate Student and Research Staff Union (2017)

NJIT Union Liaison, Biology Student Leadership, Federated Department of Biology (2016-2017, 2018-2019)

Undergraduate Mentor, New Jersey Institute of Technology (2016, 2018-2021)

- Mentored undergraduate researchers
 - CT scan reconstruction of remora cranial musculature
 - Digitization of high speed video
 - CT scan reconstruction of fish skeletal morphology

Undergraduate Mentor, College of Charleston (2013-2015)

- Mentored an undergraduate researcher on her Bachelor's Thesis, Comparative anatomical study of evolutionary variation in Sphyrnidae, Hammerhead sharks, using 3-D modeling

NSF REU Mentor, College of Charleston (2014)

- Mentored an REU participant on her project, Evolution of Head Size in Hammerhead Sharks

High School Mentor, College of Charleston (2013)

- Mentored as honors student on his project, CT scan segmentation of an Angel shark, *Squatina japonica*

Treasurer, Marine Biology Graduate Student Association Treasurer (2012-2013), **member** (2011-2014)

URI 101 Mentor, University of Rhode Island (2007, 2009)

- Mentored two classes of freshmen marine biology majors during a 1-credit seminar course
- Provided leadership and guidance to first year students

Mentor, We're Offering Women Wisdom (WOWW) (2006-2010)

SOCIETY MEMBERSHIPS

- International Women in Biomechanics, IWB (2020-2021)
- Association for Women in Science, AWIS (2019)
- American Association for the Advancement of Science, Science Program for Excellence in Science (2019)
- Society for the Study of Evolution (2019)
- Society for Integrative and Comparative Biology (2012-2021)
- Association of Ichthyologists and Herpetologists (2012-2019)
- American Elasmobranch Society (2012-2018)
- Sigma Xi (2012-2014, 2016-2019)

PROFESSIONAL SERVICE, COMMUNITY SERVICE, AND OUTREACH

- Friend of MISS (Minorities In Shark Science) (2020-2021)
- Department Ambassador to the NJIT Board of Visitors (2020)
- Reviewer for Scientific Reports, Copeia (now Ichthyology and Herpetology)
- Panelist: NJIT Teaching and Communication Skills Workshop, Teaching Panel Discussion (2019 & 2020)
- Lecture organizer for a visiting scholar (2019)
- Career Day Presenter at Martin Luther King School (13th School) in Newark, NJ (2019)
- Rutgers Day Department of Biology Volunteer (2018, 2019)
- Rutgers University-Newark Food Drive (2018)

- NJIT open house and welcome day volunteer (2017, 2018)
- Habitat for Humanity (2011, 2012, 2014, 2015)
- Road and Beach Cleanups in Charleston, SC (2011-2014)

LICENSES, CERTIFICATIONS, ETC.

Radiation Safety Training, New Jersey Institute of Technology (2018, 2020)

Laser Safety Training, New Jersey Institute of Technology (2018)

Trained User on SKYSCAN 1275 High Speed MicroCT scanner, New Jersey Institute of Technology (2017)

Trained User on XTEK XT H 255ST MicroCT scanner, Duke University (2015)

CFR/ATA Dangerous Goods Transportation Training, College of Charleston (2013)

PADI SCUBA: AWARE Specialty (2013), Advanced Open Water (2007), Open Water (2006)

Red Cross Certifications: CPR/AED and Standard First Aid (2010)

US Coast Guard Auxiliary Boating Skills and Seamanship Certification (2009)

Laboratory Animal Care and Use- Rutgers University (2009)

OTHER SKILLS

Languages: Beginner level American Sign Language and Spanish, intermediate level French

Computer: MS Word, Excel, PowerPoint, Visio; File Maker Pro; Mimics by Materialise; Rstudio

Experience with:

- 3DSlicer: SlicerMorph
- Medical and MicroCT Scanning
- MIMICS CT Scan segmentation software
- 3Matic Design Optimization Software
- Avizo CT Scan segmentation software
- Meshlab 3D file processing software
- Meshmixer 3D file processing software
- 3D Printing - MakerBot, SeeMeCNC Orion, Form1+ and Form2)
- 3D PIV (Particle Image Velocimetry)
- Kinematic Data Collection
- Handling and packaging preserved cartilaginous and bony fish specimens
- Materials testing using MTS Systems
- Restraint and care of small cetaceans and sea turtles
- Lotek Wireless Acoustic Tag and Hydrophone usage and maintenance